

## PATENT COOPERATION TREATY

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark  
Office  
(Box PCT)  
Crystal Plaza 2  
Washington, DC 20231  
ÉTATS-UNIS D'AMÉRIQUE

in its capacity as elected Office

<b>Date of mailing (day/month/year)</b> 16 June 1999 (16.06.99)	
<b>International application No.</b> PCT/US98/21635	<b>Applicant's or agent's file reference</b> F124522
<b>International filing date (day/month/year)</b> 20 October 1998 (20.10.98)	<b>Priority date (day/month/year)</b> 20 October 1997 (20.10.97)
<b>Applicant</b> AGARWAL, Anil, K. et al	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
18 May 1999 (18.05.99)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was  
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

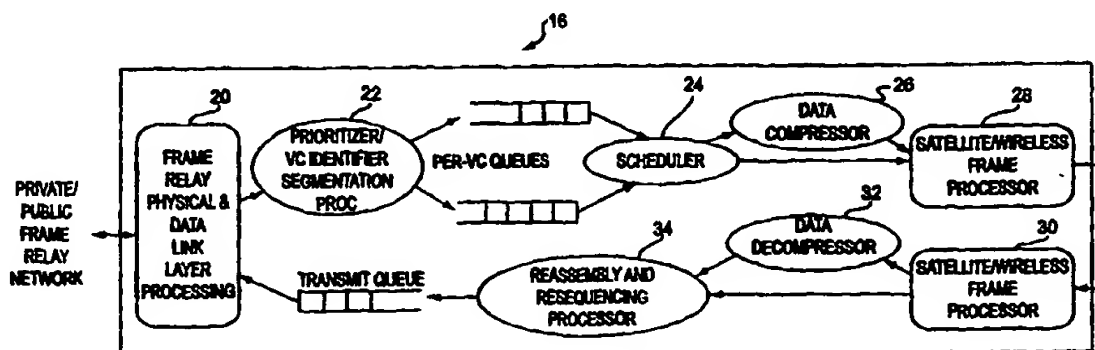
<p>The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No.: (41-22) 740.14.35</p>	<p>Authorized officer</p> <p>Lazar Joseph Panakal</p> <p>Telephone No.: (41-22) 338.83.38</p>
--	---



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>H04L 12/56</b>		A1	(11) International Publication Number: <b>WO 99/21329</b>							
			(43) International Publication Date: 29 April 1999 (29.04.99)							
(21) International Application Number: PCT/US98/21635		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).								
(22) International Filing Date: 20 October 1998 (20.10.98)		<p><b>Published</b> With international search report.</p>								
<p>(30) Priority Data:</p> <table border="0"> <tr> <td>60/062,496</td> <td>20 October 1997 (20.10.97)</td> <td>US</td> </tr> <tr> <td>60/062,497</td> <td>20 October 1997 (20.10.97)</td> <td>US</td> </tr> <tr> <td>60/064,673</td> <td>20 October 1997 (20.10.97)</td> <td>US</td> </tr> </table>				60/062,496	20 October 1997 (20.10.97)	US	60/062,497	20 October 1997 (20.10.97)	US	60/064,673
60/062,496	20 October 1997 (20.10.97)	US								
60/062,497	20 October 1997 (20.10.97)	US								
60/064,673	20 October 1997 (20.10.97)	US								
(71) Applicant (for all designated States except US): COMSAT CORPORATION [US/US]; 6560 Rock Spring Drive, Bethesda, MD 20817 (US).										
(72) Inventors; and										
(75) Inventors/Applicants (for US only): AGARWAL, Anil, K. [US/US]; 409 Midsummer Drive, Gaithersburg, MD 20878 (US). KUMAR, Sampath, V. [IN/US]; 18862 Bent Willow Circle #1025, Germantown, MD 20874 (US).										
(74) Agents: CUSHING, David, J. et al.; Sughrue, Mion, Zinn, Macpeak & Seas, PLLC, Suite 800, 2100 Pennsylvania Avenue, N.W., Washington, DC 20037-3202 (US).										

(54) Title: METHOD AND SYSTEM FOR TRANSPORT OF FRAME RELAY TRAFFIC OVER SATELLITE/WIRELESS NETWORKS



## (57) Abstract

To efficiently transmit frame relay packets between terrestrial frame relay networks (10, 12) over a satellite/wireless network (14), the packets are processed by frame relay processors (16, 18) at both ends of the satellite/wireless network (14). Variable length frame relay packets are segmented into smaller packets called spackets. The system utilizes priority queueing and a scheduler (24) transmits the spackets over the satellite/wireless link. To enhance the quality of the satellite/wireless link, each frame contains a variable number of Reed-Solomon (RS) check bytes used for error correction. Further, several frames are interleaved before transmission over the satellite/wireless link to spread the effect of burst errors over several frames. Additionally, a header compression technique saves bandwidth by compressing a Virtual Circuit (VC) identifier of the frame relay packet into a smaller value and maps the VCs to a value as specified by the size of the compressed VC field.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon			PL	Poland		
CN	China	KR	Republic of Korea	PT	Portugal		
CU	Cuba	KZ	Kazakhstan	RO	Romania		
CZ	Czech Republic	LC	Saint Lucia	RU	Russian Federation		
DE	Germany	LI	Liechtenstein	SD	Sudan		
DK	Denmark	LK	Sri Lanka	SE	Sweden		
EE	Estonia	LR	Liberia	SG	Singapore		

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US98/21635

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04L 12/56

US CL :370/395

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/395, 473, 474, 477, 315, 316, 412, 468

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

search terms: queue, satellite, priority, compress

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,745,599 A (RAYCHAUDHURI) 17 MAY 1988, abstract, lines 3-19; col. 4, lines 14-35; col. 6, lines 28-40 and 50-63	1, 7-8, 12-19, 21-22, 24, 30-31, 35-42, 44-45 ----- 6, 10-11, 29, 33-34
Y		
Y,P	US 5,812,554 A (KADAMBI et al) 22 September 1998, Figures 4a-4c	6, 10-11, 29, 33-34

☐

Further documents are listed in the continuation of Box C.

☐

See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*A* document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*B* earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
*O* document referring to an oral disclosure, use, exhibition or other means	
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

07 JANUARY 1999

Date of mailing of the international search report

03 FEB 1999

Name and mailing address of the ISA/US  
Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

KEVIN C. HARPER

Telephone No. (703) 305-3200

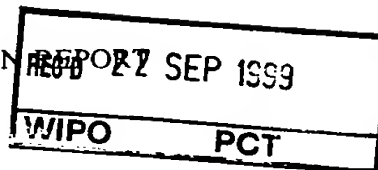
Joni Hill

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference F124522	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/US98/21635	International filing date (day/month/year) 20 OCTOBER 1998	Priority date (day/month/year) 20 OCTOBER 1997
International Patent Classification (IPC) or national classification and IPC IPC(6): H04L 12/56 and US Cl.: 370/395		
Applicant COMSAT CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets.  
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

*corrected version*

Date of submission of the demand 18 MAY 1999	Date of completion of this report 19 JULY 1999
Name and mailing address of the IPEA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer <i>Carol K. Rudolph</i> MICHAEL HORABIK
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4704

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/21635

## I. Basis of the report

1 This report has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments):*

☒ the international application as originally filed.

☒ the description, pages 1-18, as originally filed.

pages NONE, filed with the demand.

pages NONE, filed with the letter of \_\_\_\_\_.

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☒ the claims, Nos. 1-46, as originally filed.

Nos. NONE, as amended under Article 19.

Nos. NONE, filed with the demand.

Nos. NONE, filed with the letter of \_\_\_\_\_.

Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☒ the drawings, sheets/~~fig~~ 1-3, as originally filed.

sheets/~~fig~~ NONE, filed with the demand.

sheets/~~fig~~ NONE, filed with the letter of \_\_\_\_\_.

sheets/~~fig~~ \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

## 2. The amendments have resulted in the cancellation of:

☒ the description, pages NONE.

☒ the claims, Nos. NONE.

☒ the drawings, sheets/~~fig~~ NONE.

3 ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

## 4 Additional observations, if necessary:

NONE

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/21635

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims	<u>1-46</u>	YES
	Claims	<u>NONE</u>	NO
Inventive Step (IS)	Claims	<u>NONE</u>	YES
	Claims	<u>1-46</u>	NO
Industrial Applicability (IA)	Claims	<u>1-46</u>	YES
	Claims	<u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Claims 1-46 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a satellite or wireless network that receives frame relay packets, segments the packets, schedules the segmented packets according to the frame relay priority, and transmits the segmented packets in order of priority.

Raychaudhuri (US 4,745,599) cited in the International Search Report as a category "X" reference fails to teach the method of or system for transporting frame relay data as claimed.

----- NEW CITATIONS -----  
NONE

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 03 SEP 1999

WIPO PCT

Applicant's or agent's file reference FI24522	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT-US98/21635	International filing date (day/month/year) 20 OCTOBER 1998	Priority date (day/month/year) 20 OCTOBER 1997
International Patent Classification (IPC) or national classification and IPC IPC(6): H04L 12/56 and US Cl.: 370/395		
Applicant COMSAT CORPORATION		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 3 sheets.
- ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority. (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 0 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of report with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 18 MAY 1999	Date of completion of this report 19 JULY 1999
Name and mailing address of the IPEA US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer <i>James R. Matthews</i> MICHAEL HORABIK
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4704



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/21635

## I. Basis of the report

1. This report has been drawn on the basis of *(Substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain*

☒ the international application as originally filed.

☒ the description, pages 1-18, as originally filed.

pages NONE, filed with the demand.

pages NONE, filed with the letter of \_\_\_\_\_.

pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☒ the claims, Nos. 1-46, as originally filed.

Nos. NONE, as amended under Article 19.

Nos. NONE, filed with the demand.

Nos. NONE, filed with the letter of \_\_\_\_\_.

Nos. \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

☒ the drawings, sheets/~~fig~~ 1-3, as originally filed.

sheets/~~fig~~ NONE, filed with the demand.

sheets/~~fig~~ NONE, filed with the letter of \_\_\_\_\_.

sheets/~~fig~~ \_\_\_\_\_, filed with the letter of \_\_\_\_\_.

2. The amendments have resulted in the cancellation of:

☒ the description, pages NONE.

☒ the claims, Nos. NONE.

☒ the drawings, sheets/~~fig~~ NONE.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the ~~Supplemental Box~~ Additional observations below (Rule 70.2(c)).

4. Additional observations, if necessary:

NONE

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/US98/21635

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. STATEMENT**

Novelty (N)	Claims	<u>1-46</u>	YES
	Claims	<u>NONE</u>	NO
Inventive Step (IS)	Claims	<u>1-46</u>	YES
	Claims	<u>NONE</u>	NO
Industrial Applicability (IA)	Claims	<u>1-46</u>	YES
	Claims	<u>NONE</u>	NO

**2. CITATIONS AND EXPLANATIONS**

Claims 1-46 meet the criteria set out in PCT Article 33(2)-(4), because the prior art does not teach or fairly suggest a satellite or wireless network that receives frame relay packets, segments the packets, schedules the segmented packets according to the frame relay priority, and transmits the segmented packets in order of priority.

Raychaudhuri (US 4,745,599) cited in the International Search Report as a category "X" reference fails to teach the method of or system for transporting frame relay data as claimed.

----- NEW CITATIONS -----  
NONE